

2003 WETLAND MITIGATION MONITORING REPORT FAP 313 (U.S 34) Henderson County

Introduction

This document presents the 2003 wetland and vegetation monitoring results of the constructed wetland compensation for FAP 313 (US 34), Henderson County, Illinois (site location NE/4, NE/4, SW/4, Section 34, T 10 N, R 6 W, Burlington, IA quadrangle). The report follows monitoring guidelines and format set forth in the initial IDOT (Illinois Department of Transportation) monitoring request (Brooks 1999) and in four previously submitted monitoring reports (Coopridge et al. 1999, Coopridge et al. 2000, Wilm et al. 2002, Wilm et al. 2003).

Originally a wetland (Plocher *et al.* 1995), the site was converted to agriculture before having been left fallow for several years prior to excavation for mitigation purposes in 1997. Reportedly, eight herbaceous wetland species were planted in the wetland portion of the site (*Iris shrevei*, *Nuphar luteum*, *Nymphaea odorata*, *Pontederia cordata*, *Elodea canadensis*, *Scirpus tabernaemontanii*, *Sagittaria latifolia*, and *Potamogeton nodosus*), along with four species of tree seedlings (*Quercus bicolor*, *Quercus palustris*, *Carya illinoensis*, and *Carya laciniosa*) planted around much of the perimeter. On-site monitoring was conducted for the fifth consecutive year on August 13, 2003.

Project goals, objectives, and performance criteria for the wetland compensation site are included in this report, as are monitoring methods, 2003 monitoring results, and summary information. Also addressed is the status of the compensation site, with respect to meeting the project goal, objectives, and performance criteria at the end of the initially established 5-year monitoring period, which ends with the 2003 monitoring and the submittal of this report.

Project Goal, Objective, and Performance Standards

The project goal, objective, and performance standards included and evaluated in this report are those identified in the original IDOT tasking order (Brooks 1999) and are as follows:

Project Goal: The created wetland community should be a 10.13 acre (4.1 ha) emergent wetland.

Objective: A high quality marsh will develop through natural re-colonization and planting of obligate wetland species.

Performance Standards:

1. The entire created wetland (10.13 acres) should satisfy the three criteria of the federal wetland definition:
 - a) Predominance of hydrophytic vegetation. More than 50% of the dominant plant species must be hydrophytic.
 - b) Presence of hydric soils. Hydric soil characteristics should be present, or conditions favorable for hydric soil formation should be present at the site.
 - c) Presence of wetland hydrology. The compensation area must be either permanently or periodically inundated at averaged depths less than 2 m (6.6 ft) or have soils that are saturated to the surface for at least 12.5% of the growing season.

2. By the end of the fifth year, a native mean coefficient of conservatism value (native mean C value) of greater than or equal to 3.5 must be achieved, measured over the entire mitigation area. The native mean C value must increase each successive year.
3. By the end of the fifth year, the floristic quality index value (FQI) must be greater than or equal to 20 as measured over the entire mitigation site. The FQI must increase each successive year.
4. By the end of the fifth year, the native mean wetness coefficient (native mean W) must be less than or equal to 0 in the wetland community.
5. The relative importance value of total native plants (RIVn) must increase each successive year.
6. By the end of the fifth year, none of the three most dominant plant species in any of the wetland community zones may be non-native or weedy species, including, but not limited to *Phragmites australis*, *Poa compressa*, *Poa pratensis*, *Lythrum salicaria*, *Salix interior*, *Echinochloa crusgalli* or *Phalaris arundinacea*, unless otherwise indicated on the approved mitigation plan.
7. At the end of the five year monitoring period, at least 25% of the created wetland should be covered by hydrophytic vegetation. The interspersions of water and vegetation should be moderate to high. An open body of water surrounded by a continuous band of fringe vegetation is considered to have a low degree of interspersions, while a checkerboard of open water would have a high degree of interspersions.
8. The planned wetland community should be dominated by tall graminoid plants. Woody vegetation should account for less than 30% of the aerial cover.
9. A 75% survival rate shall be maintained each year for all tree species planted within the wetland mitigation site (Department of the Army, Corps of Engineers permit number: CENR-RD-328500).

Methods

Performance Standard 1

a) Predominance of Hydrophytic Vegetation

The method for determining dominant hydrophytic vegetation at a wetland site is described in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and further explained in the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (Federal Interagency Committee for Wetland Delineation 1989). It is based on areal coverage estimates for individual plant species. Each of the dominant plant species is assigned its wetland indicator status rating (Reed 1988). Any plant rated facultative or wetter (i.e., FAC, FAC+, FACW, FACW-, FACW+, and OBL) is considered a hydrophyte. A predominance of vegetation in the wetland plant community exists if more than 50% of the dominant species present are hydrophytic.

b) Occurrence of Hydric Soils

To monitor hydric soil development, soils were sampled in 1999 and verified in 2000, 2001, 2002, and 2003. Soil profile morphology, including horizon color, texture, and structure was described at representative points throughout the site. Additionally, the presence, type, size, and abundance of redoximorphic features were recorded. In the absence of hydric soil indicators, hydrologic data can be used to confirm that conditions favorable for hydric soil formation persist at the site.

c) Presence of Wetland Hydrology

The method for determining the presence of wetland hydrology at a site is described in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987). Hydrologic indicators may include, but are not limited to, drainage patterns, drift lines, sediment deposits on leaves, watermarks on trees, visual observations of saturated soils, and visual observation of inundation. Monitoring well data from the Illinois State Geological Survey (ISGS) (Fucciolo *et al.* 2003) was also used to determine wetland hydrology.

Performance Standards 2, 3, 6 and 8

Plant Community Quality and Composition

The Floristic Quality Assessment (Swink and Wilhelm 1994, Taft *et al.* 1997) was utilized to determine the floristic quality and nativity of the plant communities at the site. This method aids in identifying natural areas, monitoring restored and created wetlands, and comparing the quality of vegetation at different sites. First, each plant species native to Illinois is assigned a conservatism coefficient (C) ranging from zero to 10. Individual conservatism coefficients reflect the probability that a particular taxon correlates with anthropogenic disturbances. Plant species assigned zero tend to have low affinities for natural areas and those assigned 10 have very high affinities. A higher quality site will have more species with high conservatism coefficients. When a complete species list is compiled for a site, the mean coefficient value (mCv) and a site Floristic Quality Index can be calculated as follows:

$N =$ the number of native plant species

$MCv = \Sigma C/N$

$FQI = mCv \sqrt{N}$

Sites with FQI values less than 10 indicate low natural quality. Sites with FQI values of 20 or more possess some evidence of natural character and may be considered environmental assets.

Planted Tree Seedling Survival

In the fall of 1999, 500 each of the following four tree species were reportedly planted: *Quercus bicolor* (swamp white oak), *Quercus palustris* (pin oak), *Carya illinoensis* (pecan), and *Carya laciniata* (shellbark hickory) (letter from T. Brooks, IDOT, February 2000). All individual live trees were counted while walking the perimeter of the site, where trees were planted.

Performance Standards 4 and 7

Characterization and Extent of Hydrophytic Vegetation

In addition to being assigned a Coefficient of Conservatism, each species is also assigned a mean wetness coefficient based on the National Wetland Category for Region 3 of the U.S. Fish and Wildlife Service (Reed 1998). Plants are designated as obligate wetland (OBL), facultative wetland (FACW), facultative (FAC), facultative upland (FACU), or upland (UPL). Plus (+) and minus (-) signs are added when a plant falls between two of the above categories.

For example, FACW+ indicates that a plant is more likely to be found in a wetland than a FACW plant. Likewise, a FACU- suggests that a plant is less likely to be found in a wetland than a FACU plant. Each category is assigned a numerical value, ranging from -5 for OBL, to 0 for FAC, to +5 for UPL. These values were used to determine the mean Coefficient of Wetness (W) and the percent of the wetland covered by hydrophytic vegetation.

Performance Standard 5

Relative Importance Value of Native Plants

A baseline was established along the long axis near U.S. 34 bearing 75° east of north. The first transect was set approximately 25 m (82 ft) east-northeast of a large silver maple in the southwestern corner of the site, bearing 25° west of north. This transect begins at photo station 1 (marked by a permanent metal stake). Transects were set 30 m (98 ft) apart along the baseline; there were seven transects. Transect length and the number of 0.25 m² quadrats per transect were variable because of the shape of the mitigation site. Quadrats were set 25 m (82 ft) apart along the transects. A total of 42 quadrats were sampled. The aerial cover (indicated by cover class) of each species in the quadrats was recorded using the categories listed in Table 1. Percent cover of plant species was analyzed using cover class mid-points (Table 1).

Sampling and analysis methods are based on standard vegetation sampling procedures (Smith 1980, Cox 1985). Plant species frequency values were determined by dividing the number of plots (quadrats in which an individual species occurred) by the total number of plots sampled (42). Relative importance values for individual species and for combined native (RIV_n) and combined non-native (RIV_a) were calculated by dividing the sum of relative coverage and relative frequency by two and multiplying by 100: $[(RC + RF)/2 * 100] = RIV$.

Table 1. Cover classes used for quadrat sampling

Cover class	Range of Cover (%)	Midpoint of Range (%)
1	1-5	3.0
2	5-25	15.0
3	25-50	37.5
4	50-75	62.5
5	75-95	85.0
6	95-100	97.5

Photography Stations

As indicated and identified in the four previous monitoring reports (Coopridge et al. 1999, Coopridge et al. 2000, Wilm et al. 2002, Wilm et al. 2003), seven photo stations were established along the perimeter of the wetland mitigation site to document changes in plant community over time. Photographs are contained in Appendix E.

Results

Performance Standard 1

a) Predominance of Hydrophytic Vegetation

Dominant plant species for the wetland are shown in Table 2. All of the species are hydrophytic; four of five are obligate wetland species.

Table 2. Dominant plant species by stratum and wetland indicator status, August, 2003.

Species	Strata	Wetland Indicator Status
<i>Eleocharis erythropoda</i>	herb	OBL
<i>Eleocharis acicularis</i>	herb	OBL
<i>Typha angustifolia</i>	herb	OBL
<i>Bidens tripartita</i>	herb	OBL
<i>Acer saccharinum</i>	herb	FACW

b) Occurrence of Hydric Soils

In the fall of 1994, the wetland portions of the site had saturated soils within 0.3 m (12 in) of the surface (Plocher et al. 1995). In the 1999 monitoring season, all soils in the excavated area were determined to be hydric; this was verified in 2000, 2001, 2002, and now again in 2003. Because the soils were excavated, assumptions were made about the characteristics of the former topsoil. Based on landscape position, morphological characteristics in the lower profile, the Soils Survey of Henderson County (USDA 1956), and soils data from the mitigation site assessment (Plocher et al. 1995), the Sawmill series was determined to be present. The mollic epipedon appears to have been completely removed and an iron depleted matrix containing numerous redoximorphic concentrations is now at the surface (Table 3). At the time of monitoring in 2003, standing water was observed in only a small portion of the site and saturated soils were only found in this same area. Because of the relative dryness of the site in 2003, soils were able to be probed under the wettest part of the site. Gray sand was found at 0.5 m (20 in); free water and multicolored gray sand were found at 0.8 m (32 in). The layer was unique to this portion of the excavated wetland.

Table 3. Soil profile description for excavated wetland compensation area, August, 2003.

Depth (in)	Matrix Color	Concentrations	Depletions	Texture	Structure
0 – 8	2.5YR 4/1	7.5YR 4/6 & 3/4		Sandy Clay	Massive
8 – 20	2.5YR 4/1			Sandy Clay	Massive
20 – 32	2.5YR 4/1	N 2.5/0		Sandy Clay	Massive
32 – 41	2.5YR 4/1			Sandy Clay	Massive

c) Presence of Wetland Hydrology

This site is located in the greater Mississippi River floodplain. Although the site may only flood occasionally, the site is affected directly by the Mississippi through water table fluctuations. Field evidence of wetland hydrology included water scouring, wetland drainage patterns, depressional (excavated) landscape, surface soil saturation, and inundation. Unlike recent years, less than an estimated 10% of the site was inundated at the time of the survey in 2003. This amount of standing water was significantly less than in most previous monitoring years.

In 2003, the total area of the created wetland that conclusively satisfied the wetland hydrology criteria was 2.3 ha (5.7 acres) (Fucciolo et al. 2003). The estimated areal extent of 2003 wetland hydrology is shown in Appendix A. 2003 data shows a very substantial decrease

in wetland hydrology as compared to 2002, in fact it was the lowest among all five monitoring years (Table 4) (Fucciolo et al 2002, 2001, 2000, 1999). The five-year average of area satisfying the wetland hydrology criterion was 2.9 ha (7.1 acres).

Table 4. Area conclusively satisfying the wetland hydrology criterion (by year).

Year	hectares	acres
2003	2.3	5.7
2002	3.1	7.8
2001	3.4	8.4
2000	2.8	6.8
1999	2.8	6.9
Average	2.9	7.1

Additional information regarding the presence of hydrophytic vegetation, hydric soils, and wetland hydrology can be found in the Wetland Determination Form (Appendix B).

Performance Standards 2, 3, 6, 8, and 9

Plant Community Quality and Composition

The performance standard indicates that the goal for the Mean Coefficient of Conservatism (C) is 3.5 after five years of monitoring (this year). This was not met in 2003 or in any of the four previous monitoring years. The mean C value, including planted species was 3.1, excluding them, 2.8, and excluding only planted trees, 3.0. Although not yet meeting the performance standard, the mean C value has come to maintain itself just below this level.

By the end of the fifth year of monitoring, the FQI is required to be twenty or greater. In 2003, the FQI, including all planted species, was 31.7, without these species 27.5, without only the planted trees 30.4. All of these values are well above the performance standard; the FQI appears to have steadily increased over the last few years.

In 2003, the three most dominant plant species (ranked by descending relative importance value) were *Eleocharis erythropoda*, *Eleocharis acicularis*, and *Typha angustifolia*. Although the order was altered, these same plants were also the three most dominant in 2002. *Eleocharis acicularis* and *Eleocharis erythropoda* are both highly-desirable, native, obligate wetland species. Narrowleaf cattail (*Typha angustifolia*) is generally considered an aggressive exotic in Illinois.

Of the five dominant plant species (Table 2), at least two are "graminoid" (*Eleocharis acicularis* and *Eleocharis erythropoda*), although definitely not "tall graminoids", as specified in stated project performance standards. Although considered an exotic, narrowleaf cattail could also be considered a "tall graminoid". Apparently the term "graminoid" is not truly a scientific term, but, instead, is a general term applying to grasses and grass-like plants. Rice cutgrass (*Leersia oryzoides*), a "tall graminoid", was also very prevalent, having the highest relative importance value after the five dominant species.

Although woody vegetation appears to have increased, primarily encroaching from the wooded margins of the site, it still remained a relatively minor component of the wetland plant community. Silver maple (*Acer saccharinum*), occurring principally as seedlings, was found to

be a dominant, having a relative importance value of 7.88 and a relative cover percent of 5.99 (Appendix C). However, quantitative sampling results revealed only a total relative importance value of 9.98 and a total relative cover percent of 7.56 for all woody species combined (Appendix C). In addition to silver maple, other woody species observed and/or sampled included: river birch (*Betula nigra*), catalpa (*Catalpa speciosa*), buttonbush (*Cephalanthus occidentalis*), rough-leaved dogwood (*Cornus drummondii*), persimmon (*Diospyros virginiana*), autumn olive (*Elaeagnus umbellata*), green ash (*Fraxinus pennsylvanica*), white mulberry (*Morus alba*), cottonwood (*Populus deltoides*), common blackberry (*Rubus allegheniensis*), peach-leaved willow (*Salix amygdaloides*), sandbar willow (*Salix exigua*), and black willow (*Salix nigra*) (Appendix D). Given that this monitoring year was the driest of the five-year monitoring period, increased woody encroachment was to be expected. Many of these woody seedlings will likely not survive long-term, unable to tolerate extended periods of inundation up to several inches in depth, conditions common in previous monitoring years.

Planted Tree Seedling Survival

Only three species of planted trees were observed during 2003 monitoring (Table 4). Pecan (*Carya illinoensis*), swamp white oak (*Quercus bicolor*), and pin oak (*Quercus palustris*) were all commonly sampled, but no shellbark hickory (*Carya laciniosa*) were recorded. It seems likely that no shellbark hickory were ever planted. In 2000, Coopridge reported finding three shellbark hickory seedlings, but questioned their identification (Coopridge et al. 2000).

The majority of planted trees seedlings (mostly now shrubs) appeared healthy and vigorous, with a good chance at long term survival. In 2003, fewer planted trees seedlings were counted than in 2002, 614 compared to 831. In 2002, trees were counted earlier in the year (5 June), in an attempt to get an accurate count before surrounding vegetation grew to obscure the presence of the still small trees. This was not done in 2003; it was hoped that the majority of surviving trees would have reached a height to have been easily observed and counted. In any case, average survival was 40.9%. This survival rate is substantially lower than the 75% required in the performance standards set forth for this project. This survival rate also excludes the 500 shellbark hickory seedlings that were apparently never planted. Of the three observed species, pecans had the lowest survival rate, a very low 15%.

Table 4. Observed survival rates of planted tree seedlings, August, 2003.

Tree Species	Number Planted (reportedly)	Number Observed Alive	Survival Rate (%)
<i>Carya illinoensis</i>	500	75	15.0
<i>Carya laciniosa</i>	500	0	0.0
<i>Quercus bicolor</i>	500	261	52.2
<i>Quercus palustris</i>	500	278	55.6
Overall	2000	614	30.7
Overall (excluding <i>Carya laciniosa</i>)	1500	614	40.9

Performance Standards 4 and 7

Characterization and Extent of Hydrophytic Vegetation

The mean Coefficient of Wetness (mean W) for the entire excavated area was strongly negative, although less so than in 2002 (Appendix D). This was to be expected with the apparent lack of precipitation. Overall, it was -2.1 when including all planted species, -1.9 when excluding all planted species, and -2.1 when excluding planted tree species. Mean W for native species only was -2.6 when including all planted species, -2.4 when excluding all planted species, and -2.6 when excluding planted tree species.

Similar to previous years, hydrophytic vegetation appeared to dominate throughout the entire excavated area. All quadrats sampled in 2003 contained dominant hydrophytic vegetation. As in past years, the periphery of the area tended to contain more species typical of non-wetland habitats (e.g., *Solidago canadensis*, *Cassia fasciculata*, *Ambrosia artemisiifolia*, *Aster pilosus*, *Erigeron annuus*, *Festuca pratensis*, *Melilotus alba*, *Setaria faberi*), but nonetheless, this fringe area was still dominated by hydrophytes. Due to the dryness of the wetland in 2003, these non-wetland species may have extended further into the interior of the wetland than in previous years. Although the vegetation of the fringe area was more mixed than the interior portion of the site, vegetation typical of marsh habitat still tended to dominate, especially *Eleocharis* spp. Based on these sampling results, the entire excavated area could be considered to be marsh.

The interspersions of water and vegetation was not as favorable as in recent years, due to the lack of standing water. Open areas in the interior of the wetland, where standing water would normally have been, were still evident. Less than 10% of the wetland was inundated at the time of monitoring in 2003. As in previous years, inundated and recently inundated areas of the wetland were comprised of plants such as *Eleocharis* spp., *Eleocharis canadensis*, *Nymphaea odorata*, and *Potamogeton* spp., along with emergents such as *Typha* spp., *Scirpus* spp., *Sagittaria latifolia*, *Sparganium eurycarpum*, *Acorus calamus*, and *Alisma plantago-aquatica*.

Performance Standard 5

Relative Importance Value of Native Plants

The relative importance value of native plants (RIVn) in 2003 was 87.95 (Appendix C), a substantial increase from the previous year (79.29) and very similar to 2001 (89.97) (Wilm et al. 2003, 2002). This change was primarily the result of a sampled decrease in narrowleaf cattail (10.23). This level was similar to that of 2001 (9.13), but was a large decrease from the sampled level of 2002 (19.35) (Wilm et al. 2003). Narrowleaf cattail was the most "important" plant species overall in 2002, but was only third in 2003, behind two native spikerush species (*Eleocharis erythropoda* and *Eleocharis acicularis*). Only four other species of non-native plants were sampled, all very minor components of the plant community. Reed canary grass (*Phalaris arundinacea*), an exotic species problematic in many Illinois wetlands, was infrequently observed and did not even appear in the quantitative sampling. Exotic, non-native species had a total relative importance value of only 11.89, of which 86% was accounted for by narrowleaf cattail alone. By contrast, excluding planted species, 94 species native to Illinois were recorded, of which 75 were both native and perennial (Appendix D). Only 20 annual species were observed, 16.7% of all species occurring in the wetland.

Summary and Recommendations

At the conclusion of the five-year monitoring period, results indicate that this wetland compensation site is continuing its development towards a quality, stable, wetland community. Based on 2003 results, the site meets three of nine performance standards (3, 4, and 7) completely. The FQI for the site far exceeded twenty (the performance standard), both when including (31.7) and excluding (27.5) planted species. The native, mean Coefficient of Wetness (W) was strongly negative (as required in the performance standard). Native mean W was -2.6 when including all planted species, -2.4 when excluding all planted species, and -2.6 when excluding planted tree species. Hydrophytic vegetation appeared to dominate throughout the entire excavated area, as all sampled quadrats contained dominant hydrophytic vegetation. Although 2003 was a dry year at the site and standing water was quite low, interspersions of water and vegetation was favorable. Areas of shallow open water, as well as bare, recently dry areas, were interspersed with stands of hydrophytic vegetation throughout much of the wetland.

Performance Standard 1 (satisfying the three wetland criteria for jurisdictional wetlands) is met for the majority of the site. Dominant hydrophytic vegetation and hydric soils are present across the entire excavated area, although according to the ISGS (Fucciolo et al. 2003) wetland hydrology was present for only 2.3 ha (5.7 acres) during the 2003 monitoring year. This acreage was the lowest among all five monitoring years and was due to below average precipitation at the site during 2003.

The goal of a mean Coefficient of Conservatism (C) of 3.5 or greater (Performance Standard 2) was not met in 2003 or in any of the previous four monitoring years. The mean C for the site, including planted species, was 3.1, excluding them, 2.8, and excluding only planted trees, 3.0. These values decreased from 2002 (Wilm et al. 2003), probably due to the invasion of more weedy, nonhydrophytic species during a dry year.

As specified in Performance Standard 5, the relative importance value of native plants (RIVn) must increase in each successive year. This has not been the consistent pattern throughout the five-year monitoring period, but the RIVn did increase substantially in 2003. RIVn in 2003 was 87.95 compared to 79.29 in 2002 (Wilm et al. 2003), again reaching a level near that of 2001 (89.97) (Wilm et al. 2002). This year-to-year fluctuation can be attributed to the fluctuation in the sampled prevalence of narrowleaf cattail. RIVn values above or near eighty can be considered a good result, despite the lack of a consistent, year-to-year upward trend.

In 2003, the three most dominant plant species (ranked by descending relative importance value) were *Eleocharis erythropoda*, *Eleocharis acicularis*, and *Typha angustifolia*. The prevalence of narrowleaf cattail as the third most dominant species conflicts with Performance Standard 6. Narrowleaf cattail is an aggressive, weedy exotic that tends to dominate wetlands, often to the point of excluding many desirable native plant species.

As specified in Performance Standard 8, tall graminoid plant species must dominate the created wetland, with woody vegetation remaining a minor component (<30% aerial cover). Based on 2003 sampling results, woody vegetation met the performance standard, having a total relative cover percent of only 7.56. This, however, was an increase from the previous year and silver maple (occurring principally as seedlings) did increase to the point of becoming a dominant and the fifth most "important" plant species (based on quantitative sampling results). In general, however, tall graminoids do not dominate the area. Although narrowleaf cattail may or may not be considered a graminoid species, it is generally not considered desirable. Two other graminoid species (*Eleocharis acicularis* and *E. erythropoda*) are among the dominant

plants (actually the two most dominant species), although they would be definitely not be considered "tall".

With regard to survival of planted tree seedlings, sampling results clearly do not meet those set forth in Performance Standard 9. As previously stated in past monitoring reports, it appears that the 500 shellbark hickory seedlings that were supposed to be planted, never were. Even when excluding these trees, average survival for all planted trees in 2003 was only 40.9%. Due to the difficulty in observing planted tree seedlings over the entire monitoring period, counted tree numbers did vary beyond what can be attributed solely to year-to-year changes in survival. However, even given these inaccuracies, overall tree survival rate was well under the 75% required.

In summary, at the conclusion of the five-year monitoring period this created wetland site appears to have developed into a wetland representative of those typically found in this region of Illinois. While, from a floristic quality standpoint, it is definitely not natural area quality, it does, however, exhibit the desired structure of an emergent-dominated marsh. As documented and discussed in previous monitoring reports (Wilm et al. 2003, 2002), the prevalence of narrowleaf cattail is less than desirable. The dominance of this species directly contributes to the failure to meet three of the performance standards (2, 5, & 6), and possibly a fourth (Performance Standard 8), depending on whether or not cattail is to be considered a "graminoid". Although a dominant in the wetland, it has not shown signs of taking over the site, in fact, its prevalence decreased substantially in 2003. Several performance standards will likely never be met without decreasing the prevalence of this species; however, as long as narrowleaf cattail continues to persist near or below its current level, it will likely have no substantial negative impact on the structure and functioning of the created wetland.

As stated in the overall project goal, 10.13 acres (4.1 ha) of wetland habitat was to be created. Although substantial acreage has created, it appears not to have reached to desired total. The area of the created wetland conclusively satisfying the wetland hydrology criterion in a given monitoring year varied from a low of 5.7 acres in 2003 to a high of 8.4 acres in 2001, averaging 7.1 acres (Table 4). These acreages, although significant, fall well below the desired acreage needed for the stated wetland compensation.

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Appendix A. Estimated areal extent of 2003 wetland hydrology (Fucciolo et al. 2003).

FAP 313 (U.S. 34) Wetland Compensation Site
 (based on data collected between September 1, 2002 and September 1, 2003)
 (map based on USGS digital orthophotograph, Burlington NW quarter quadrangle)



- ISGS monitoring well
- ⬢ ISGS benchmark
- ✱ rain gauge
- RDS level logger

estimated areal extent of 2003 wetland hydrology

estimated areal extent of IDOT excavation

0 100 m
0 300 ft

Figure prepared by ISGS



Appendix B. Routine wetland determination form, August 2003.

Routine On-site Wetland Determination
 Excavated Wetland Compensation Area
 (page 1 of 2)

Field Investigators: Wilm, Kurylo, Feist, Tessene

Date: August 13, 2003

Contract Number: 88516

Project Name: FAP 313 (U.S. 34)

State: Illinois **County:** Henderson

Applicant: IDOT District 4

Site Name: Marsh (Excavated Wetland Compensation Area)

Legal Description: NE1/4 NE 1/4 SW 1/4 sec. 34 T.10N. - R.6W.

Location: Begins approximately 23 m (75 ft) north of U.S 34, 91 m (300 ft) east of an excavated lake in Gulfport, and south of Crystal Lake.

Do normal environmental conditions exist at this site? Yes: X No:
 Have the vegetation, soils and/or hydrology been significantly disturbed? Yes: No: X

VEGETATION

Dominant Plant Species	Indicator Status	Stratum
<i>Acer saccharinum</i>	FACW	herb
<i>Bidens tripartita</i>	OBL	herb
<i>Eleocharis acicularis</i>	OBL	herb
<i>Eleocharis erythropoda</i>	OBL	herb
<i>Typha angustifolia</i>	OBL	herb

Percentage of plant species that are OBL, FACW, FAC+, or FAC: 100%

Hydrophytic vegetation? Yes: X No:

Rationale: More than 50% of the dominants are OBL, FACW, FAC+ or FAC.
 In fact all dominant species are OBL.

SOILS

Series and phase: Sawmill silty clay loam

On county hydric soils list? Yes: X No:

Is the soil a histosol? Yes: No: X

Histic epipedon present? Yes: No: X

Redox concentrations: Yes: X No: X

Redox depletions: Yes: No: X

Matrix color: 2.5YR 4/1

Color: 7.5YR 4/6 & 3/4

Other indicators: The site is an excavated depression within the overall landscape. Partial inundation was also observed.

Hydric soils: Yes: X No:

Rationale: The soils in this area are hydric. This is evidenced by a low chroma matrix and redoximorphic features. The soil also meets the NRCS hydric soil indicator F3 (depleted matrix).

Routine On-site Wetland Determination
Excavated Wetland Compensation Area
 (page 2 of 2)

Field Investigators: Wilm, Kurylo, Feist, Tessene

Date: August 13, 2003

Contract Number: 88516

Project Name: FAP 313 (U.S. 34)

State: Illinois

County: Henderson

Applicant: IDOT District 4

Site Name: Marsh (Excavated Wetland Compensation Area)

Legal Description: NE1/4 NE 1/4 SW 1/4 sec. 34 T.10N. - R.6W.

Location: Begins approximately 23 m (75 ft) north of U.S 34, 91 m (300 ft) east of an excavated lake in Gulfport, and south of Crystal Lake.

HYDROLOGY

Inundated? Yes: X (partially) No: Depth of standing water: Up to 0.3 m (12 in)

Depth to saturated soil: Surface to >1 m (40 in)

Overview of hydrological flow through the system: This site is located in an excavated area that is affected by the Mississippi River via water table fluctuations and occasional flooding.

Additional hydrologic inputs include precipitation and sheet flow from higher ground.

Evapotranspiration, soil infiltration, and possible ground water recharge are hydrologic outputs.

Size of watershed: Approximately 259,000 km² (100,000 mi²) (estimated from 119,000 mi² drainage area at Keokuk, IA) (LaTour et al. 1995)

Other field evidence observed: Standing water, surface scouring, wetland drainage patterns, and presence of algal mats.

Wetland hydrology? Yes: X No:

Rationale: Observation of inundation, location in an excavated area, and field indicators of wetland hydrology suggest that this site is inundated for a significant duration during the growing season.

DETERMINATION AND RATIONALE

Is this site a wetland? Yes: X No:

Rationale for decision: This site has hydrophytic vegetation, hydric soils, and wetland hydrology.

Determined by: Brian Wilm, Paul Tessene and Mary Ann Feist
 (vegetation and hydrology)
 Jesse Kurylo (soils and hydrology)
 Illinois Natural History Survey
 Center for Wildlife Ecology
 607 East Peabody Drive
 Champaign, Illinois 61820
 (217) 244-2176 (Wilm)

Appendix C. Vegetation sampling results for FAP 313 (U.S. 34) mitigation wetland (n=42), Henderson County, IL, August 13, 2003.

Species	Total Cover (%)	Average % Cover per Plot	Relative Cover (%)	Frequency	Relative Frequency (%)	Relative Importance Value
<i>Eleocharis erythropoda</i> ^P	777.5	18.51	15.88	0.57	9.02	12.45
<i>Eleocharis acicularis</i> ^P	668.5	15.92	13.66	0.64	10.15	11.90
<i>Typha angustifolia</i> ^{*P}	542.0	12.90	11.07	0.60	9.40	10.23
<i>Bidens tripartita</i> ^A	480.0	11.43	9.80	0.38	6.02	7.91
<i>Acer saccharinum</i> ^P	293.0	6.98	5.99	0.62	9.77	7.88
<i>Leersia oryzoides</i> ^P	248.0	5.90	5.07	0.19	3.01	4.04
<i>Bidens cernua</i> ^A	196.0	4.67	4.00	0.24	3.76	3.88
<i>Solidago canadensis</i> ^P	185.5	4.42	3.79	0.24	3.76	3.77
<i>Potamogeton nodosus</i> ^P	213.5	5.08	4.36	0.19	3.01	3.68
<i>Bidens aristosa</i> ^A	186.0	4.43	3.80	0.19	3.01	3.40
<i>Cassia fasciculata</i> ^A	139.0	3.31	2.84	0.17	2.63	2.74
<i>Polygonum punctatum</i> ^A	134.0	3.19	2.74	0.17	2.63	2.68
<i>Alisma plantago-aquatica</i> ^P	119.0	2.83	2.43	0.14	2.26	2.34
<i>Scirpus tabernaemontani</i> ^P	85.0	2.02	1.74	0.17	2.63	2.18
<i>Solidago gigantea</i> ^P	81.0	1.93	1.65	0.17	2.63	2.14
<i>Nymphaea odorata</i> ^P	100.0	2.38	2.04	0.05	0.75	1.40
<i>Salix exigua</i> ^P	58.5	1.39	1.19	0.10	1.50	1.35
<i>Pontederia cordata</i> ^P	56.0	1.33	1.14	0.10	1.50	1.32
<i>Rotala ramosior</i> ^A	19.5	0.46	0.40	0.12	1.88	1.14
<i>Setaria glauca</i> ^{*A}	17.0	0.40	0.35	0.12	1.88	1.11
<i>Ludwigia alternifolia</i> ^P	19.0	0.45	0.39	0.10	1.50	0.95
<i>Populus deltoides</i> ^P	33.0	0.79	0.67	0.07	1.13	0.90
<i>Sagittaria latifolia</i> ^P	30.5	0.73	0.62	0.07	1.13	0.88
<i>Scirpus fluviatilis</i> ^P	62.5	1.49	1.28	0.02	0.38	0.83
<i>Echinochloa muricata</i> ^A	7.0	0.17	0.14	0.10	1.50	0.82
<i>Eupatorium serotinum</i> ^P	21.0	0.50	0.43	0.07	1.13	0.78
<i>Agalinis tenuifolia</i> ^A	30.0	0.71	0.61	0.05	0.75	0.68

*Indicates species not native to Illinois.

A – Annual; P – Perennial

(Table continues on following page.)

Appendix C. Continued.

Species	Total Cover (%)	Average % Cover per Plot	Relative Cover (%)	Frequency	Relative Frequency (%)	Relative Importance Value
<i>Ammania coccinea</i> ^A	9.0	0.21	0.18	0.07	1.13	0.66
<i>Cyperus</i> sp.	6.5	0.15	0.13	0.07	1.13	0.63
<i>Eleocharis obtusa</i> ^A	6.5	0.15	0.13	0.07	1.13	0.63
<i>Cyperus esculentus</i> ^P	4.0	0.10	0.08	0.07	1.13	0.60
<i>Salix nigra</i> ^P	18.0	0.43	0.37	0.05	0.75	0.56
<i>Ambrosia artemisiifolia</i> ^A	3.5	0.08	0.07	0.05	0.75	0.41
<i>Aster pilosus</i> ^P	3.5	0.08	0.07	0.05	0.75	0.41
<i>Carex bebbii</i> ^P	15.0	0.36	0.31	0.02	0.38	0.34
<i>Carex vulpinoidea</i> ^P	15.0	0.36	0.31	0.02	0.38	0.34
<i>Asclepias incarnata</i> ^P	3.0	0.07	0.06	0.02	0.38	0.22
<i>Carex scoparia</i> ^P	3.0	0.07	0.06	0.02	0.38	0.22
<i>Cyperus aristatus</i> ^A	3.0	0.07	0.06	0.02	0.38	0.22
<i>Cyperus strigosus</i> ^P	0.5	0.01	0.01	0.02	0.38	0.19
<i>Gratiola neglecta</i> ^A	0.5	0.01	0.01	0.02	0.38	0.19
<i>Melilotus alba</i> ^{*B}	0.5	0.01	0.01	0.02	0.38	0.19
<i>Morus alba</i> ^{*P}	0.5	0.01	0.01	0.02	0.38	0.19
<i>Penthorum sedoides</i> ^P	0.5	0.01	0.01	0.02	0.38	0.19
<i>Poa pratensis</i> ^{*P}	0.5	0.01	0.01	0.02	0.38	0.19
<i>Polygonum</i> sp.	0.5	0.01	0.01	0.02	0.38	0.19
Native Species	4334.5	103.20	88.54	5.53	87.36	87.95
Non-native Species	560.5	13.35	11.45	0.78	12.32	11.89
Perennial Species	3657.5	87.08	74.71	4.44	70.14	72.43
Native Perennial Species	3114.5	74.15	63.62	3.68	58.14	60.88
Annual	1231.0	29.31	25.15	1.82	28.75	26.95
All Species	4895.5	116.56	99.98	6.33	100.05	99.95

*Indicates species not native to Illinois.

A – Annual; B – Biennial; P – Perennial

Appendix D. Plant species list for FAP 313 (U.S. 34) mitigation wetland, Henderson County, Illinois, August 13, 2003.

Scientific name	Common name	Stratum	Wetland indicator status	Coefficient of Wetness	Coefficient of Conservatism	Annual or Perennial
<i>Acer saccharinum</i>	silver maple	shrub, herb	FACW	-3	1	P
<i>Acorus calamus</i>	sweetflag	herb	OBL	-5	4	P
<i>Agalinus tenuifolia</i>	slender false foxglove	herb	FACW	-3	5	A
<i>Alisma plantago-aquatica</i>	broad-leaf water-plantain	herb	OBL	-5	2	P
<i>Ambrosia artemisiifolia</i>	common ragweed	herb	FACU	3	0	A
<i>Ammannia coccinea</i>	long-leaved ammannia	herb	OBL	-5	5	A
<i>Andropogon virginicus</i>	broom sedge	herb	FAC-	1	1	P
<i>Anemone canadensis</i>	meadow anemone	herb	FACW	-3	4	P
<i>Apocynum sibiricum</i>	Indian hemp	herb	FAC+	-1	2	P
<i>Asclepias incarnata</i>	swamp milkweed	herb	OBL	-5	4	P
<i>Asclepias syriaca</i>	common milkweed	herb	UPL	5	0	P
<i>Asclepias verticillata</i>	horsetail milkweed	herb	UPL	5	1	P
<i>Aster pilosus</i>	hairy aster	herb	FACU+	2	0	P
<i>Aster simplex</i>	panicled aster	herb	FACW	-3	3	P
<i>Betula nigra</i>	river birch	shrub, herb	FACW	-3	4	P
<i>Bidens aristosa</i>	swamp marigold	herb	FACW	-3	1	A
<i>Bidens cernua</i>	nodding beggar-ticks	herb	OBL	-5	2	A
<i>Bidens tripartita</i>	beggartick	herb	OBL	-5	2	A
<i>Boehmeria cylindrica</i>	false nettle	herb	OBL	-5	3	P
<i>Bromus japonicus</i>	Japanese brome	herb	FACU	3	*	A
<i>Campsis radicans</i>	trumpet creeper	herb	FAC	0	2	P
<i>Carex annectens</i>	large yellow fox sedge	herb	FACW	-3	3	P
<i>Carex bebbii</i>	Bebb's oval sedge	herb	OBL	-5	8	P

*Species not native to Illinois

(Species list continues on following page.)

Appendix D. Continued.

Scientific name	Common name	Stratum	Wetland indicator status	Coefficient of Wetness	Coefficient of Conservatism	Annual or Perennial
<i>Carex frankii</i>	bristly cattail sedge	herb	OBL	-5	4	P
<i>Carex hyalinolepis</i>	southern lake sedge	herb	OBL	-5	4	P
<i>Carex scoparia</i>	lance-fruited oval sedge	herb	FACW	-3	5	P
<i>Carex</i> spp.	sedges	herb	----	--	--	--
<i>Carex tribuloides</i>	awl-fruited oval sedge	herb	FACW+	-4	3	P
<i>Carex vulpinoidea</i>	fox sedge	herb	OBL	-5	3	P
<i>Carya illinoensis</i>	pecan	shrub	FACW	-3	6 (planted)	P
<i>Cassia fasciculata</i>	golden cassia	herb	FACU-	4	1	A
<i>Catalpa speciosa</i>	catalpa	shrub	FACU	3	0	P
<i>Cephalanthus occidentalis</i>	buttonbush	shrub, herb	OBL	-5	4	P
<i>Cirsium discolor</i>	field thistle	herb	UPL	5	2	B**
<i>Cornus drummondii</i>	rough-leaved dogwood	shrub, herb	FAC	0	2	P
<i>Coronilla varia</i>	crown vetch	herb	UPL	5	*	P
<i>Cyperus aristatus</i>	bearded flatsedge	herb	OBL	-5	2	A
<i>Cyperus esculentus</i>	chufa	herb	FACW	-3	0	P
<i>Cyperus</i> sp.	flatsedge	herb	----	--	--	--
<i>Cyperus strigosus</i>	straw colored flatsedge	herb	FACW	-3	0	P
<i>Dactylis glomerata</i>	orchard grass	herb	FACU	3	*	P
<i>Daucus carota</i>	Queen-Anne's-lace	herb	UPL	5	*	B**
<i>Desmodium paniculatum</i>	panicked tick trefoil	herb	FACU	3	2	P
<i>Diospyros virginiana</i>	persimmon	shrub	FAC	0	2	P
<i>Echinochloa muricata</i>	barnyard grass	herb	OBL	-5	0	A

*Species not native to Illinois

**Biennial

(Species list continues on following page.)

Appendix D. Continued.

Scientific name	Common name	Stratum	Wetland indicator status	Coefficient of Wetness	Coefficient of Conservatism	Annual or Perennial
<i>Elaeagnus umbellata</i>	autumn olive	shrub, herb	UPL	5	*	P
<i>Eleocharis acicularis</i>	needle spike rush	herb	OBL	-5	3	P
<i>Eleocharis compressa</i>	flat-stemmed spike rush	herb	OBL	-5	7	P
<i>Eleocharis erythropoda</i>	spikerush	herb	OBL	-5	3	P
<i>Eleocharis obtusa</i>	spikerush	herb	OBL	-5	2	A
<i>Elodea canadensis</i>	anacharis	herb	OBL	-5	5 (planted)	P
<i>Elymus canadensis</i>	Canada wild rye	herb	FAC-	1	4	P
<i>Erigeron annuus</i>	annual fleabane	herb	FAC-	1	1	B**
<i>Eupatorium perfoliatum</i>	common boneset	herb	FACW+	-4	4	P
<i>Eupatorium serotinum</i>	late boneset	herb	FAC+	-1	1	P
<i>Festuca pratensis</i>	fescue	herb	FACU-	4	*	P
<i>Fraxinus pennsylvanica</i>	green ash	shrub, herb	FACW	-3	2	P
<i>Geum canadense</i>	white avens	herb	FAC	0	2	P
<i>Geum laciniatum</i>	rough avens	herb	FACW	-3	2	P
<i>Gratiola neglecta</i>	clammy hedge hyssop	herb	OBL	-5	5	A
<i>Hordeum jubatum</i>	fox-tail barley	herb	FAC+	-1	*	P
<i>Hypericum punctatum</i>	spotted St. Johns-wort	herb	FAC+	-1	3	P
<i>Iris shrevei</i>	southern blue flag	herb	OBL	-5	5 (planted)	P
<i>Juncus effusus solutus</i>	common rush	herb	OBL	-5	4	P
<i>Juncus torreyi</i>	Torrey rush	herb	FACW	-3	3	P
<i>Leersia oryzoides</i>	rice cutgrass	herb	OBL	-5	3	P
<i>Lemna minor</i>	common duckweed	herb	OBL	-5	3	A

*Species not native to Illinois

**Biennial

(Species list continues on following page.)

Appendix D. Continued.

Scientific name	Common name	Stratum	Wetland indicator status	Coefficient of Wetness	Coefficient of Conservatism	Annual or Perennial
<i>Leptochloa fascicularis</i>	bearded sprangle top	herb	OBL	-5	0	A
<i>Lobelia cardinalis</i>	cardinal-flower	herb	OBL	-5	6	P
<i>Ludwigia alternifolia</i>	seedbox	herb	OBL	-5	5	P
<i>Ludwigia palustris americana</i>	marsh purslane	herb	OBL	-5	4	P
<i>Lycopus americanus</i>	common water horehound	herb	OBL	-5	3	P
<i>Lysimachia lanceolata</i>	lance-leaved loosestrife	herb	FAC	0	6	P
<i>Lythrum alatum</i>	winged loosestrife	herb	OBL	-5	5	P
<i>Melilotus alba</i>	white sweet clover	herb	FACU	3	*	B**
<i>Menispermum canadense</i>	moonseed	herb	FAC	0	4	P
<i>Mimulus ringens</i>	monkey flower	herb	OBL	-5	5	P
<i>Morus alba</i>	white mulberry	shrub, herb	FAC	0	*	P
<i>Nymphaea odorata</i>	fragrant water lily	herb	OBL	-5	6 (planted)	P
<i>Panicum capillare</i>	witch grass	herb	FAC	0	0	A
<i>Panicum virgatum</i>	prairie switchgrass	herb	FAC+	-1	4	P
<i>Penstemon digitalis</i>	foxglove beard-tongue	herb	FAC-	1	4	P
<i>Penthorum sedoides</i>	ditch stonecrop	herb	OBL	-5	2	P
<i>Phalaris arundinacea</i>	reed canary grass	herb	FACW+	-4	*	P
<i>Poa pratensis</i>	Kentucky bluegrass	herb	FAC-	1	*	P
<i>Polygonum amphibium</i>	water smartweed	herb	OBL	-5	3	P
<i>Polygonum pensylvanicum</i>	giant smartweed	herb	FACW+	-4	1	A
<i>Polygonum punctatum</i>	dotted smartweed	herb	OBL	-5	3	A
<i>Polygonum</i> sp.	smartweed	herb	----	--	--	--

*Species not native to Illinois

**Biennial

(Species list continues on following page.)

Appendix D. Continued.

Scientific name	Common name	Stratum	Wetland indicator status	Coefficient of Wetness	Coefficient of Conservatism	Annual or Perennial
<i>Pontederia cordata</i>	pickerelweed	herb	OBL	-5	8 (planted)	P
<i>Populus deltoides</i>	eastern cottonwood	shrub, herb	FAC+	-1	2	P
<i>Potamogeton nodosus</i>	American pondweed	herb	OBL	-5	7 (planted)	P
<i>Potamogeton pectinatus</i>	comb pondweed	herb	OBL	-5	5	P
<i>Prunella vulgaris</i>	self-heal	herb	FAC	0	*	P
<i>Quercus bicolor</i>	swamp white oak	shrub	FACW+	-4	7 (planted)	P
<i>Quercus palustris</i>	pin oak	shrub, herb	FACW	-3	4 (planted)	P
<i>Ratibida pinnata</i>	drooping coneflower	herb	UPL	5	4	P
<i>Rotala ramosior</i>	tooth-cup	herb	OBL	-5	4	A
<i>Rubus allegheniensis</i>	common blackberry	shrub, herb	FACU+	2	2	P
<i>Rudbeckia hirta</i>	black-eyed Susan	herb	FACU	3	2	P
<i>Rumex altissimus</i>	pale dock	herb	FACW-	-2	2	P
<i>Rumex crispus</i>	curly dock	herb	FAC+	-1	*	P
<i>Sagittaria latifolia</i>	arrowhead	herb	OBL	-5	4 (planted)	P
<i>Salix amygdaloides</i>	peach-leaved willow	shrub, herb	FACW	-3	4	P
<i>Salix exigua</i>	sandbar willow	shrub, herb	OBL	-5	1	P
<i>Salix nigra</i>	black willow	shrub, herb	OBL	-5	3	P
<i>Scirpus cyperinus</i>	wool grass	herb	OBL	-5	5	P
<i>Scirpus fluviatilis</i>	river bulrush	herb	OBL	-5	3	P
<i>Scirpus tabernaemontanii</i>	great bulrush	herb	OBL	-5	4 (planted)	P
<i>Setaria faberi</i>	giant foxtail	herb	FACU+	2	*	A
<i>Setaria glauca</i>	pigeon grass	herb	FAC	0	*	A
<i>Solanum carolinense</i>	horse-nettle	herb	FACU-	4	0	P

*Species not native to Illinois

(Species list continues on following page.)

Appendix D. Continued.

Scientific name	Common name	Stratum	Wetland indicator status	Coefficient of Wetness	Coefficient of Conservatism	Annual or Perennial
<i>Solidago canadensis</i>	Canada goldenrod	herb	FACU	3	1	P
<i>Solidago gigantea</i>	late goldenrod	herb	FACW	-3	3	P
<i>Sorghastrum nutans</i>	Indian grass	herb	FACU+	2	4	P
<i>Sparganium eurycarpum</i>	burreed	herb	OBL	-5	5	P
<i>Spartina pectinata</i>	freshwater cord grass	herb	FACW+	-4	4	P
<i>Stachys tenuifolia</i>	slenderleaf betony	herb	OBL	-5	5	P
<i>Teucrium canadense</i>	American germander	herb	FACW-	-2	3	P
<i>Typha angustifolia</i>	narrow-leaved cattail	herb	OBL	-5	*	P
<i>Typha latifolia</i>	cattail	herb	OBL	-5	1	P
<i>Verbena hastata</i>	blue vervain	herb	FACW+	-4	3	P
<i>Verbena urticifolia</i>	white vervian	herb	FAC+	-1	3	P

*Species not native to Illinois

Total number of species (including all planted species) - 120

Total number of species (excluding all planted species) - 110

Total number of species (excluding all planted tree species) - 117

Number of hydrophytic species (including all planted species) - 93 (77.5%)

Number of hydrophytic species (excluding all planted species) - 83 (75.5%)

Number of hydrophytic species (excluding planted tree species) - 90 (76.9%)

Number of species native to Illinois (including all planted species) - 104 (86.7%)

Number of species native to Illinois (excluding all planted species) - 94 (85.5%)

Number of species native to Illinois (excluding planted tree species) - 101 (86.3%)

FQI (including all planted species) = $R/\sqrt{N} = 323/\sqrt{104} = 31.7$

FQI (excluding all planted species) = $R/\sqrt{N} = 267/\sqrt{94} = 27.5$

FQI (excluding planted tree species) = $R/\sqrt{N} = 306/\sqrt{101} = 30.4$

(Summary information continues on the following page.)

Appendix D. Continued.

Mean Coefficient of Conservatism (C) (including all planted species) = $R/N = 323/104 = 3.1$

Mean Coefficient of Conservatism (C) (excluding all planted species) = $R/N = 267/94 = 2.8$

Mean Coefficient of Conservatism (C) (excluding planted tree species) = $R/N = 306/101 = 3.0$

Mean Coefficient of Wetness (including all planted species) = $-252/120 = -2.1$

Mean Coefficient of Wetness (excluding all planted species) = $-207/110 = -1.9$

Mean Coefficient of Wetness (excluding planted tree species) = $-242/117 = -2.1$

Mean Coefficient of Wetness for native species (including all planted species) = $-272/104 = -2.6$

Mean Coefficient of Wetness for native species (excluding all planted species) = $-227/94 = -2.4$

Mean Coefficient of Wetness for native species (excluding planted tree species) = $-262/101 = -2.6$

Number of perennial species (including all planted species) – 96 (80.0%)

Number of perennial species (excluding all planted species) – 86 (78.2%)

Number of perennial species (excluding planted tree species) – 93 (79.5%)

Number of perennial species native to Illinois (including all planted species) – 85 (70.8%)

Number of perennial species native to Illinois (excluding all planted species) – 75 (68.2%)

Number of perennial species native to Illinois (excluding planted tree species) – 82 (70.1%)

Number of annual species – 20 (16.7%)

Appendix E. Photographs from permanent photograph stations.



Figure 1. Photo station 1, facing north



Figure 2. Photo station 2, facing northeast



Figure 3. Photo station 3, facing northwest



Figure 4. Photo station 4, facing west



Figure 5. Photo station 5, facing west



Figure 6. Photo station 6, facing south



Figure 7. Photo station 7, facing north